The purpose of this worksheet is to demonstrate,
that even though the Midpoint of a set of 3 points,
is just a point, as part of a Simpson's Sum, it
can represent a trapezoid which is parallel to the
Trap Function, of the same Simpson's Sum, without the result changing.

To illustrate, I'm going to use the polynomial:
y = x^2 - x
Clearly, the slope at x == 0 will be -1, and not 0 .

(%i1)
```
load("draw")$
```

(%i2)
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Poly(x) := x^2 - x$
```

(%i3)
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wxdraw2d(
grid = true,
xrange = [-1, +1],
fill_color = blue,
filled_func = true,
explicit(Poly(x), x, -1, 1),
point_type = filled_circle,
color = red,
points([[-1, Poly(-1)], [0, Poly(0)], [+1, Poly(+1)]]),
filled_func = false,
color = red,
line_width = 2,
explicit(1 - x, x, -1, 1),
color = green,
explicit(0, x, -1, 1),
color = black,
explicit(-x, x, -1, 1)
)$
```

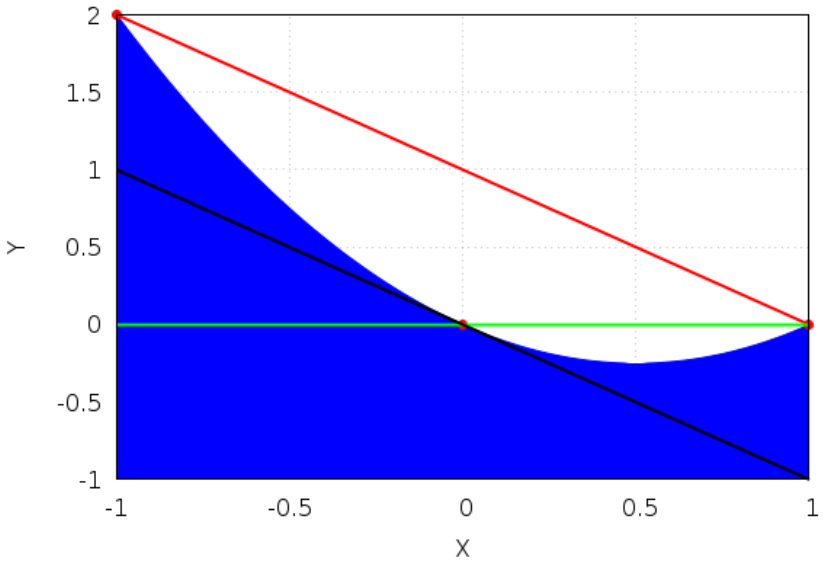

(%t3)

Note how there are two straight lines, that both correspond
to the Midpoint-value. Since green tends to look stranger
than blue or black, the green line has a (wrong) slope of zero.

But there will always be a straight line which passes through:
Poly(0)
and, which has a slope there equal to the slope of the Trap Function,
which has been represented by the red line. That version of the
Midpoint-function has been represented by the black line,
because it is more correct.

Casual inspection reveals, that the area under the green and
under the black line will be equal, regardless of what their
slope has been made. So, if an allowance is made for either
version of the Midpoint-function spanning two intervals,
the Midpoint-value will also state the area under each function.

(%i4) integrate(Poly(x), x, -1, +1);

$$\frac{2}{3} \qquad (\%o4)$$

(%i5) Trap: ((Poly(-1) + Poly(+1)) / 2) * 2;

$$2 \qquad (\text{Trap})$$

(%i6) Midp: Poly(0) * 2;

$$0 \qquad (\text{Midp})$$

(%i7) SimpSum: (Midp * (2 / 3)) + (Trap / 3);

$$\frac{2}{3} \qquad (\text{SimpSum})$$